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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
HIROYUKI KURIMURA, ET AL.	: EXAMINER: MULLIS, JEFFREY C.
SERIAL NO: 10/549,574	:
FILED: SEPTEMBER 19, 2005	: GROUP ART UNIT: 1796
FOR: LINEAR BLOCK COPOLYMER COMPOSITION	:

APPEAL BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Further to the December 4, 2008 Notice of Appeal, this is an Appeal from the September 4, 2008 Office Action.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Denki Kagaku Kogyo Kabushiki Kaisha, Tokyo, Japan.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals, interferences, or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-10 are pending and stand rejected.

The rejections of claims 1-10 are being appealed.

IV. STATUS OF AMENDMENTS

No Amendment After Final Rejection was filed.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 is directed to a linear block copolymer composition including from 55 to 95 mass % of a vinyl aromatic hydrocarbon and from 5 to 45 mass % of a conjugated diene as monomer units. *See* present specification, page 4, lines 5 to 9; claim 1. The linear block copolymer composition is a mixture of a linear block copolymer having at least three types of polymer blocks with different molecular weights, each comprising a vinyl aromatic hydrocarbon as monomer units and represented by the formula S-B-S, where S is a polymer block comprising a vinyl aromatic hydrocarbon as monomer units, and B is a polymer block

consisting of conjugated diene monomer units. *See* present specification, page 4, lines 10 to 18; claim 1. The molecular weight distribution (Mw/Mn) of a mixture of the polymer blocks each comprising a vinyl aromatic hydrocarbon as monomer units, is within a range of from 3.35 to 6. *See* present specification, page 4, lines 19 to 22; claim 1. In a gel permeation chromatogram of a mixture of the polymer blocks each comprising a vinyl aromatic hydrocarbon as monomer units, M1/M2 is within a range of from 12.5 to 25, where M1 is the peak top molecular weight corresponding to a peak at which the peak top molecular weight becomes maximum among peaks forming a proportion of the area of at least 30% to the whole peak area, and M2 is the peak top molecular weight corresponding to a peak at which the peak top molecular weight becomes minimum among peaks at which the peak top molecular weight is at most 50,000 and which form a proportion of the area of at least 20% to the whole peak area. *See* present specification, page 4, line 22 to page 5, line 7; claim 1. Claims 2-9 depend directly or indirectly from claim 1. *See* claims 2-9.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Rejection Under 35 U.S.C. §102 or §103

Claims 1-10 are rejected under 35 U.S.C. §102(b), or in the alternative under 35 U.S.C. §103(a), over U.S. Patent No. 5,393,838 to Moczygembe et al. ("Moczygembe 838").

B. Rejection Under 35 U.S.C. §103

Claims 1-10 are rejected under 35 U.S.C. §103(a) over U.S. Patent No. 5,705,569 to Moczygembe et al. ("Moczygembe 569").

C. Obviousness-Type Double Patenting

Claims 1-10 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-13 of U.S. Patent Application No. 10/549,572. This provisional rejection is not addressed on appeal, as Appellants have requested that the provisional rejection be held in abeyance until the 572 application issues as a patent or the present application is otherwise in condition for allowance.

VII. ARGUMENT

Appellants submit that the outstanding rejections should be reversed for the following reasons.

A. Rejection Under 35 U.S.C. §102 or §103

As indicated above, claims 1-10 are rejected under 35 U.S.C. §102(b), or in the alternative under 35 U.S.C. §103(a), over Moczygembe 838.

Claim 1 recites "[a] linear block copolymer composition, comprising from 55 to 95 mass% of a vinyl aromatic hydrocarbon and from 5 to 45 mass% of a conjugated diene as monomer units; wherein: the linear block copolymer composition is a mixture of a linear block copolymer having at least three types of polymer blocks with different molecular weights, each comprising a vinyl aromatic hydrocarbon as monomer units and represented by the following formula: S-B-S where S is a polymer block comprising a vinyl aromatic hydrocarbon as monomer units, and B is a polymer block consisting of conjugated diene

monomer units ..." (emphasis added). Moczygembe 838 does not disclose or suggest such a composition.

As is plain from the excerpt above, claim 1 requires a linear block copolymer given by the formula S-B-S, where B is a conjugated diene homopolymer block. Moczygembe 838 discloses a polymer obtained by charges of vinyl aromatic hydrocarbon monomers and conjugated diene monomers. *See, e.g.,* Moczygembe 838, Abstract. As is evident from the description of Moczygembe 838, the disclosed polymer composition is obtained by a particular sequence of monomer charges. *See, e.g.,* Moczygembe 838, column 1, line 57 to column 2, line 31. All of the charges in Moczygembe 838 include a vinyl aromatic hydrocarbon monomers or a mixture of vinyl aromatic hydrocarbon monomers and conjugated diene monomers, except for the last charge. The last charge includes only conjugated diene monomers. Accordingly, only the last charge in Moczygembe 838 creates a conjugated diene homopolymer block, corresponding to the block B in claim 1. However, because the conjugated diene homopolymer block is the last block added, the resulting structure does not satisfy the formula S-B-S – the block B in claim 1 is set between two S blocks.

Moczygembe 838 further indicates that the obtained block copolymers may be coupled. *See* Moczygembe 838, column 2, lines 35 to 41. That is, after the sequence of monomer charges discussed above, a coupling agent is added, so that the obtained block copolymers may be linked to form, e.g., radial copolymer molecules. *See* Moczygembe 838, column 2, lines 54 to 59. The formula of claim 1 does not provide for the presence of coupling agents. Moreover, even when coupled, the copolymers of Moczygembe 838 do not include a single conjugated diene homopolymer block (i.e., a block consisting of conjugated

diene monomer units) set between two vinyl aromatic hydrocarbon monomer blocks and/or the coupled structures are not linear, as recited in claim 1. That is, because of the sequence of steps by which the copolymer of Moczygembe 838 is produced, it differs in structure and composition from the composition of claim 1.

The Examiner attempts to compare the expected molecular weight properties of the compositions of Moczygembe 838 to the molecular weight properties recited in claim 1. *See, e.g.,* September 4, 2008 Office Action, pages 4 to 5. However, due to the categorical differences between the compositions of Moczygembe 838 and the composition of claim 1, such comparisons are inapposite. The compositions of Moczygembe 838 and the composition of claim 1 are comparable only in their respective overall compositions (e.g., ratio of styrene to butadiene). The properties of a block copolymer composition, such as dynamic properties, impact strength, transparency, compatibility, etc., are determined by characteristics, such as molecular weight, molecular weight distribution, morphology, structure of soft and hard segments, etc. Because the differences between the compositions of Moczygembe 838 and the composition of claim 1 are fundamental, it would not be possible to obtain a composition having the properties possible in the composition of claim 1 based on the teachings of Moczygembe 838.

As explained, claim 1 is not anticipated by and would not have been rendered obvious by Moczygembe 838. Claims 2-10 depend from claim 1 and, thus, also are not anticipated by and would not have been rendered obvious by Moczygembe 838. Accordingly, reversal of the rejection is respectfully requested.

B. Rejection Under 35 U.S.C. §103

As indicated above, claims 1-10 are rejected under 35 U.S.C. §103(a) over Moczygembe 569.

Claim 1 is set forth above. Moczygembe 569 does not disclose or suggest such a composition.

As is evident from the excerpt above, claim 1 requires a linear block copolymer given by the formula S-B-S, where B is a conjugated diene homopolymer block. Moczygembe 569 discloses a polymer obtained by charges of vinyl aromatic hydrocarbon monomers and conjugated diene monomers. *See, e.g.,* Moczygembe 569, Abstract. As can be discerned from the description of Moczygembe 569, the disclosed polymer composition is obtained by several different specified sequences of monomer charges. *See, e.g.,* Moczygembe 569, column 2, lines 7 to 20. Most of the sequences of charges in Moczygembe 569 include either charges of a vinyl aromatic hydrocarbon monomers or charges of a mixture of vinyl aromatic hydrocarbon monomers and conjugated diene monomers – no charges of conjugated diene monomers alone. These sequences cannot yield the composition of claim 1, because the resulting polymers do not include a conjugated diene homopolymer block – all of the blocks are either vinyl aromatic hydrocarbon homopolymer blocks or mixed vinyl aromatic hydrocarbon/conjugated diene copolymer blocks.

In one Example, Moczygembe 569 disclose a sequence of charges including a final charge of conjugated diene monomers alone. *See* Moczygembe 569, column 6, line 53 to column 7, line 19. In this Example of Moczygembe 569, only the last charge creates a conjugated diene homopolymer block, corresponding to the block B in claim 1. However, because the conjugated diene homopolymer block is the last block added, the resulting

structure does not satisfy the formula S-B-S – the block B in claim 1 is set between two S blocks. Moczygembe 569 further indicates that the obtained block copolymers may be coupled. *See* Moczygembe 569, column 2, lines 50 to 55. The formula of claim 1 does not provide for the presence of coupling agents. Moreover, even when coupled, the copolymers of Moczygembe 569 do not include a single conjugated diene homopolymer block (i.e., a block consisting of conjugated diene monomer units) set between two vinyl aromatic hydrocarbon monomer blocks and/or the coupled structures are not linear, as recited in claim 1. That is, because of the sequence of steps by which the copolymer of Moczygembe 569 is produced, it differs in structure and composition from the composition of claim 1.

As with Moczygembe 838 discussed above, the Examiner attempts to compare the expected molecular weight properties of the compositions of Moczygembe 569 to the molecular weight properties recited in claim 1. *See, e.g.,* September 4, 2008 Office Action, pages 2 to 4. However, due to the categorical differences between the compositions of Moczygembe 569 and the composition of claim 1, such comparisons are inapposite. The compositions of Moczygembe 569 and the composition of claim 1 are comparable only in their respective overall compositions (e.g., ratio of styrene to butadiene). The properties of a block copolymer composition, such as dynamic properties, impact strength, transparency, compatibility, etc., are determined by characteristics, such as molecular weight, molecular weight distribution, morphology, structure of soft and hard segments, etc. Because the differences between the compositions of Moczygembe 569 and the composition of claim 1 are fundamental, it would not be possible to obtain a composition having the properties possible in the composition of claim 1 based on the teachings of Moczygembe 569.

As explained, claim 1 would not have been rendered obvious by Moczygembe 569. Claims 2-10 depend from claim 1 and, thus, also would not have been rendered obvious by Moczygembe 569. Accordingly, reversal of the rejection is respectfully requested.

C. Obviousness-Type Double Patenting

As indicated above, the provisional rejection of claims 1-10 under the judicially created doctrine of obviousness-type double patenting over claims 1-13 of the 572 application is not addressed on appeal, as Appellants have requested that the provisional rejection be held in abeyance until the 572 application issues as a patent or the present application is otherwise in condition for allowance.

VIII. CONCLUSION

For the above reasons, it is respectfully requested that all outstanding rejections of the pending claims be REVERSED.

Respectfully submitted,

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CLAIMS APPENDIX

Claim 1 (Previously Presented): A linear block copolymer composition, comprising from 55 to 95 mass% of a vinyl aromatic hydrocarbon and from 5 to 45 mass% of a conjugated diene as monomer units;

wherein:

the linear block copolymer composition is a mixture of a linear block copolymer having at least three types of polymer blocks with different molecular weights, each comprising a vinyl aromatic hydrocarbon as monomer units and represented by the following formula:

S-B-S

where S is a polymer block comprising a vinyl aromatic hydrocarbon as monomer units, and B is a polymer block consisting of conjugated diene monomer units; and further,

(1) the molecular weight distribution (Mw/Mn) of a mixture of the polymer blocks each comprising a vinyl aromatic hydrocarbon as monomer units, is within a range of from 3.35 to 6, and

(2) in a gel permeation chromatogram of a mixture of the polymer blocks each comprising a vinyl aromatic hydrocarbon as monomer units, M1/M2 is within a range of from 12.5 to 25, where M1 is the peak top molecular weight corresponding to a peak at which the peak top molecular weight becomes maximum among peaks forming a proportion of the area of at least 30% to the whole peak area, and M2 is the peak top molecular weight corresponding to a peak at which the peak top molecular weight becomes minimum among peaks at which the peak top molecular weight is at most 50,000 and which form a proportion of the area of at least 20% to the whole peak area.

Claim 2 (Original): The linear block copolymer composition according to Claim 1, wherein in a gel permeation chromatogram of a mixture of the polymer blocks each comprising a vinyl aromatic hydrocarbon as monomer units, the proportion of the number of moles of S1 to the sum of the numbers of moles of S1 and S2 is within a range of from 5 to 25 mol%, where S1 is a component corresponding to a peak at which the peak top molecular weight becomes maximum among peaks forming a proportion of the area of at least 30% to the whole peak area, and S2 is a component corresponding to a peak at which the peak top molecular weight becomes minimum among peaks at which the peak top molecular weight is at most 50,000 and which form a proportion of the area of at least 20% to the whole peak area.

Claim 3 (Original): The linear block copolymer composition according to Claim 1 or 2, wherein the peak top molecular weight M2 is within a range of from 4,500 to 20,000.

Claim 4 (Previously Presented): The linear block copolymer composition according to Claim 1, wherein the peak top molecular weight M1 is within a range of from 90,000 to 200,000.

Claim 5 (Previously Presented): The linear block copolymer composition according to Claim 1, wherein in a gel permeation chromatogram of the linear block copolymer composition, the molecular weight distribution (Mw/Mn) of a component corresponding to a peak at which the peak top molecular weight becomes maximum among peaks forming a proportion of the area of at least 30% to the whole peak area, is less than 1.03.

Claim 6 (Previously Presented): The linear block copolymer composition according to Claim 1, wherein in a gel permeation chromatogram of the linear block copolymer composition, M3/M4 is within a range of from 2.5 to 4.5, where M3 is the peak top molecular weight corresponding to a peak at which the peak top molecular weight becomes maximum among peaks forming a proportion of the area of at least 30% to the whole peak area, and M4 is the peak top molecular weight corresponding to a peak at which the peak top molecular weight becomes minimum among peaks forming a proportion of the area of at least 15% to the whole peak area.

Claim 7 (Previously Presented): The linear block copolymer composition according to Claim 1, wherein in a gel permeation chromatogram of the linear block copolymer composition, the peak top molecular weight of a component which provides the maximum peak area is within a range of from 120,000 to 250,000.

Claim 8 (Previously Presented): A composition comprising the linear block copolymer composition according to Claim 1, and a thermoplastic resin other than the linear block copolymer composition.

Claim 9 (Original): The composition according to Claim 8, wherein the mass ratio of the linear block copolymer composition/the thermoplastic resin is from 30/70 to 70/30.

Claim 10 (Previously Presented): The composition according to Claim 8, wherein the thermoplastic resin is a polystyrene polymer.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.